

WE CLAIM:

1. A method of fabricating an inductor comprising:  
forming a plurality of vias in a substrate;  
forming a magnetic core within the substrate;  
depositing a first conductive material into the vias to form a plurality of conductive posts; and  
fabricating a plurality of conductive segments that interconnect the plurality conductive posts to form a conductive coil surrounding the magnetic core.
2. The method of Claim 1, wherein forming the plurality of vias comprises extending the vias entirely through the substrate.
3. The method of Claim 1, wherein forming the plurality of vias comprises forming two substantially parallel rows of vias extending through the substrate.
4. The method of Claim 1, wherein forming the plurality of vias comprises using an etching process.
5. The method of Claim 1, wherein forming the plurality of vias comprises using a laser.
6. The method of Claim 1, wherein the substrate comprises a semiconductor wafer.
7. The method of Claim 1, wherein the substrate comprises silicon.
8. The method of Claim 1, wherein the substrate comprises silicon carbide.
9. The method of Claim 1, wherein the substrate comprises germanium.
10. The method of Claim 1, wherein forming the magnetic core comprises depositing a magnetic oxide.
11. The method of Claim 1, wherein forming the magnetic core comprises depositing ferromagnetic material by chemical vapor deposition.
12. The method of Claim 1, wherein forming a magnetic core comprises:  
forming a porous region in the substrate; and  
depositing a ferromagnetic material in the porous region.
13. The method of Claim 1, wherein forming the conductive coil comprises depositing copper.

14. The method of Claim 1, wherein forming the conductive coil comprises depositing gold.

15. The method of Claim 1, wherein fabricating the plurality of conductive segments comprises forming a plurality of conductive straps interconnecting the conductive posts to form the conductive coil.

16. The method of Claim 15, wherein forming the plurality of conductive straps comprises using a second conductive material, wherein the first conductive material is not the same as the second conductive material.

17. The method of Claim 15, wherein the conductive posts are configured in two substantially parallel rows.

18. The method of Claim 1, wherein the substrate has at least two substantially parallel surfaces, and wherein the conductive posts are substantially perpendicular to the parallel surfaces.

19. The method of Claim 1, wherein the conductive posts have circular cross-sections.

20. The method of Claim 1, wherein the conductive posts are at least partially surrounded by an insulating material.

21. The method of Claim 20, wherein the insulating material comprises polyimide.

22. The method of Claim 1, wherein the inductor has an inductance of at least 1 nanohenry.

23. The method of Claim 1, further comprising covering the conductive coil with a passivation layer.

24. The method of Claim 23, wherein the passivation layer is configured to electrically insulate the inductor and to protect the inductor from physical damage.

25. The method of Claim 1, further comprising operatively coupling the inductor to an integrated circuit formed on the substrate.

26. The method of Claim 25, wherein the integrated circuit is a computer memory circuit.

27. An inductor comprising:

a substrate;  
a magnetic core formed within the substrate;  
a plurality of vias filled with conductive material providing a plurality of conductive paths through the substrate; and  
a plurality of conductive segments interconnecting the plurality of conductive paths to form a conductive coil surrounding the magnetic core.

28. The inductor of Claim 27, wherein the substrate comprises a semiconductor wafer.

29. The inductor of Claim 27, wherein the substrate comprises silicon.

30. The inductor of Claim 27, wherein the plurality of conductive paths comprises vias through the substrate filled with a conductive material.

31. The inductor of Claim 27, wherein the magnetic core comprises a porous region of the substrate treated with a ferromagnetic material.